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EXAMINER

ART UNIT	PAPER NUMBER
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10

DATE MAILED:

EXAMINER INTERVIEW SUMMARY RECORD

All participants (applicant, applicant's representative, PTO personnel):

(1) Evan Smith (3) M. Wilczewski

(2) Gerald Ferguson (4) Dr. Yamazaki

Date of interview October 28, 1996 (5) Mr. Yanai

Type: ☐ Telephonic ☒ Personal (copy is given to ☐ applicant ☒ applicant's representative).

Exhibit shown or demonstration conducted: ☐ Yes ☒ No. If yes, brief description: _____

Agreement ☐ was reached with respect to some or all of the claims in question. ☒ was not reached.

Claims discussed: all

Identification of prior art discussed: newly cited US Patent 5,561,081 to Takenouchi et al.

Description of the general nature of what was agreed to if an agreement was reached, or any other comments: Appl. argued that the rectangular cross section of laser beam is what makes the appl. allowable. Claim language has been proposed which is the same as in the Takenouchi patent. Discussed use of ambient during laser anneal and pointed out that Takenouchi is limited to activation of impurities.

(A fuller description, if necessary, and a copy of the amendments, if available, which the examiner agreed would render the claims allowable must be attached. Also, where no copy of the amendments which would render the claims allowable is available, a summary thereof must be attached.)

☐ 1. It is not necessary for applicant to provide a separate record of the substance of the interview.

Unless the paragraph below has been checked to indicate to the contrary, A FORMAL WRITTEN RESPONSE TO THE LAST OFFICE ACTION IS NOT WAIVED AND MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW (e.g., items 1-7 on the reverse side of this form). If a response to the last Office action has already been filed, then applicant is given one month from this interview date to provide a statement of the substance of the interview.

☐ 2. Since the examiner's interview summary above (including any attachments) reflects a complete response to each of the objections, rejections and requirements that may be present in the last Office action, and since the claims are now allowable, this completed form is considered to fulfill the response requirements of the last Office action. Applicant is not relieved from providing a separate record of the substance of the interview unless box 1 above is also checked.

Mick
Examiner's Signature

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Proposed amendment
presented during interview
on 10/28/96

Please cancel claims 10, 11, 14, 15, 22, 27-29, 35-36, 41-42, and 44-46 without prejudice or disclaimer.

8. (Amended) An apparatus for processing a semiconductor on a substrate comprising:

laser light generating means for generating a laser light wherein a cross section of said laser light perpendicular to a length of said laser light has a width and a height, with said width greater than said height;

an irradiation apparatus for irradiating [a] said laser light [having a rectangular form] to said semiconductor therein in an atmosphere comprising oxygen to form a silicon oxide layer on a surface of said semiconductor; and

[a vacuum apparatus for a vacuum processing; and

a mechanism for transporting said substrate from said vacuum apparatus to said irradiation apparatus without exposing said substrate to outside air,]

scanning means for producing relative movement between [wherein] said semiconductor on said substrate [is moved] and said laser light during the irradiation of said laser light [so that a length of said laser light is longer than a length of said substrate on a surface of said semiconductor,] to scan said semiconductor with said laser light [over a whole surface of said substrate].

9. The apparatus of claim 8 wherein said irradiation apparatus is a laser etching apparatus, a laser annealing apparatus or a laser doping apparatus.

12. (Amended) The apparatus of claim 8 [further comprising a laser for emitting a laser light] wherein [the emitted] said laser light is introduced into said irradiation apparatus through a window provided in a wall of said irradiation apparatus.

13. The apparatus of claim 8 wherein said irradiation apparatus comprises a holder for holding said substrate therein, and said holder can be moved relative to said light.

21. (Amended) An apparatus for [processing a semiconductor device] forming a silicon oxide layer on a semiconductor film formed on a substrate, comprising:

[at least a] light processing chamber means for [treating a substrate] containing said film and said substrate in an atmosphere comprising oxygen, said light processing chamber means having [with a laser light having a rectangular form therein by irradiating said substrate with said laser light through] a light window [provided] on a wall of said light processing chamber means; [and]

laser light generating means for generating a laser light for crystallizing said semiconductor film on said substrate and forming a silicon oxide layer thereon, wherein a cross section of said laser light perpendicular to a length of said laser light has a width and a height, with said width greater than said height, said laser light generating means transmitting said laser light through said light window to irradiate said semiconductor film;

an evacuable chamber for performing a vacuum treatment therein[, wherein said apparatus is provided with a] ;

transfer means for transferring an object from said light processing chamber means to said evacuable chamber, or vice versa without exposing said object to air[, and wherein];

scanning means for relatively moving said semiconductor film formed on said substrate and said laser light [is moved] in a direction [perpendicularly to said laser light in said light processing chamber] parallel to said height of said laser light during the irradiation of said [substrate] semiconductor film with said laser light to crystallize [an entire] said semiconductor film [provided] formed on said substrate and to form a silicon oxide layer on said semiconductor film.

23. The apparatus of claim 21 wherein said evacuable chamber is selected from the group consisting of a film formation chamber, an etching chamber, and a heat-treatment chamber.

47. (Amended) The apparatus of claim 8 wherein said substrate has a size of 300 mm by 400 mm, and said height is 2 mm, and said width is 350 mm [laser light having a rectangular form has a size of 2 mm x 350 mm].

48. (Amended) The apparatus of claim 21 wherein said substrate has a size of 300 mm by 400 mm, and said height is 2 mm, and said width is 350 mm [laser light having a rectangular form has a size of 2 mm x 350 mm].

49. (Amended) The apparatus of claim [42] 55 wherein said substrate has a size of 300 mm by 400 mm, and said height is 2 mm, and said width is 350 mm [laser light having a rectangular form has a size of 2 mm x 350 mm].

50. (Amended) The apparatus of claim [44] 56 wherein said substrate has a size of 300 mm by 400 mm, and said height is 2 mm, and said width is 350 mm [laser light having a rectangular form has a size of 2 mm x 350 mm].

51. (Amended) The apparatus of claim [42] 59 wherein said substrate has a size of 300 mm by 400 mm, and said height is 2 mm, and said width is 350 mm [laser light having a rectangular form has a size of 2 mm x 350 mm].

52. (Amended) The apparatus of claim [44] 62 wherein said substrate has a size of 300 mm by 400 mm, and said height is 2 mm, and said width is 350 mm [laser light having a rectangular form has a size of 2 mm x 350 mm].

53. (Amended) The apparatus of claim [45] 63 wherein said substrate has a size of 300 mm by 400 mm, and said height is 2 mm, and said width is 350 mm [laser light having a rectangular form has a size of 2 mm x 350 mm].

54. (Amended) The apparatus of claim [46] 64 wherein said substrate has a size of 300 mm by 400 mm, and said height is 2 mm, and said width is 350 mm [laser light having a rectangular form has a size of 2 mm x 350 mm].

Please add the following new claims:

--55. An apparatus for producing a semiconductor on a substrate comprising:

laser light generating means for generating a laser light wherein a cross section of said laser light perpendicular to a length of said laser light has a width and a height, with said width greater than said height;

an irradiation apparatus for irradiating said laser light to said semiconductor therein in an atmosphere containing nitrogen to form a silicon nitride layer on a surface of said semiconductor; and

scanning means for producing relative movement between said semiconductor on said substrate and said laser light during the irradiation of said laser light to scan said semiconductor with said laser light.

--56. An apparatus for producing a semiconductor on a substrate comprising:

a chemical vapor deposition chamber for forming a film on a substrate by chemical vapor deposition therein;

a laser irradiation chamber for holding said film and substrate in an atmosphere comprising oxygen;

laser light generating means for generating a laser light wherein a cross section of said laser light perpendicular to a length of said laser light has a width and a height, with said width greater than said height, and for irradiating said film in said atmosphere comprising oxygen in said laser irradiation chamber to form an oxide layer on said film and to crystallize said film; and

a transferring chamber provided with transferring means and provided between said chemical vapor deposition chamber and said laser irradiation chamber, said transferring means transferring said film formed on said substrate from said chemical vapor deposition chamber to said laser irradiation chamber. --

--57. The apparatus of claim 56 wherein said film is irradiated with said laser light over a whole surface of said substrate.--

--58. The apparatus of claim 56 wherein said transferring means comprises a robotic hand.--

--59. An apparatus for producing a semiconductor on a substrate comprising:

a chemical vapor deposition chamber for forming a film on a substrate by chemical vapor deposition therein;

a laser irradiation chamber for holding said film and substrate in an atmosphere comprising nitrogen;

laser light generating means for generating a laser light wherein a cross section of said laser light perpendicular to a length of said laser light has a width and a height, with said width greater than said height, and for irradiating said film in said atmosphere comprising nitrogen in said laser irradiation chamber to form a nitride layer on said film and to crystallize said film; and

a transferring chamber provided with transferring means and provided between said chemical vapor deposition chamber and said laser irradiation chamber, said transferring means transferring said film formed on said substrate from said chemical vapor deposition chamber to said laser irradiation chamber. --

--60. The apparatus of claim 59 wherein said film is irradiated with said laser light over a whole surface of said substrate.--

--61. The apparatus of claim 59 wherein said transferring means comprises a robotic hand.--

--62. An apparatus for producing a semiconductor on a substrate comprising:

laser light generating means for generating a laser light wherein a cross section of said laser light perpendicular to a length of said laser light has a width and a height, with said width greater than said height;

an irradiation apparatus for irradiating said laser light to said semiconductor therein in an atmosphere containing nitrogen to form a silicon nitride layer on a surface of said semiconductor; and

scanning means for producing relative movement between said semiconductor on said substrate and said laser light, in a direction parallel to said height of said laser light, during the irradiation of said laser light to scan said semiconductor with said laser light.

--63. An apparatus for producing a semiconductor on a substrate comprising:

laser light generating means for generating a laser light wherein a cross section of said laser light perpendicular to a length of said laser light has a width and a height, with said width greater than said height;

an irradiation apparatus for irradiating said laser light to said semiconductor therein in an atmosphere containing oxygen to form a silicon oxide layer on a surface of said semiconductor; and

scanning means for producing relative movement between said semiconductor on said substrate and said laser light, in a direction parallel to said height of said laser light, during the irradiation of said laser light to scan said semiconductor with said laser light.

-- 64. An apparatus for forming a silicon nitride layer on a semiconductor film formed on a substrate, comprising:

light processing chamber means for containing said film and said substrate in an atmosphere comprising nitrogen, said light processing chamber

means having a light window on a wall of said light processing chamber means;

laser light generating means for generating a laser light for crystallizing said semiconductor film on said substrate and forming a silicon nitride layer thereon, wherein a cross section of said laser light perpendicular to a length of said laser light has a width and a height, with said width greater than said height, said laser light generating means transmitting said laser light through said light window to irradiate said semiconductor film;

an evacuable chamber for performing a vacuum treatment therein;

transfer means for transferring an object from said light processing chamber means to said evacuable chamber, or vice versa without exposing said object to air; and

scanning means for relatively moving said semiconductor film formed on said substrate and said laser light in a direction parallel to said height of said laser light during the irradiation of said semiconductor film with said laser light to crystallize said semiconductor film formed on said substrate and to form a silicon nitride layer on said semiconductor film.

--65. The apparatus of claim 8 wherein said semiconductor is scanned with said laser light over a whole surface of said substrate.--

--66. The apparatus of claim 55 wherein said semiconductor is scanned with said laser light over a whole surface of said substrate.--

--67. The apparatus of claim 8 wherein said semiconductor is crystallized by the irradiation of said laser light at the same time as the formation of said silicon oxide layer.--

--68. The apparatus of claim 55 wherein said semiconductor is crystallized by the irradiation of said laser light at the same time as the formation of said silicon nitride layer.--

--69. The apparatus of claim 62 wherein said semiconductor is crystallized by the irradiation of said laser light at the same time as the formation of said silicon nitride layer.--

--70. The apparatus of claim 63 wherein said semiconductor is crystallized by the irradiation of said laser light at the same time as the formation of said silicon oxide layer.--

--71. The apparatus of claim 62 wherein said semiconductor is scanned with said laser light over a whole surface of said substrate.--

--72. The apparatus of claim 63 wherein said semiconductor is scanned with said laser light over a whole surface of said substrate.--